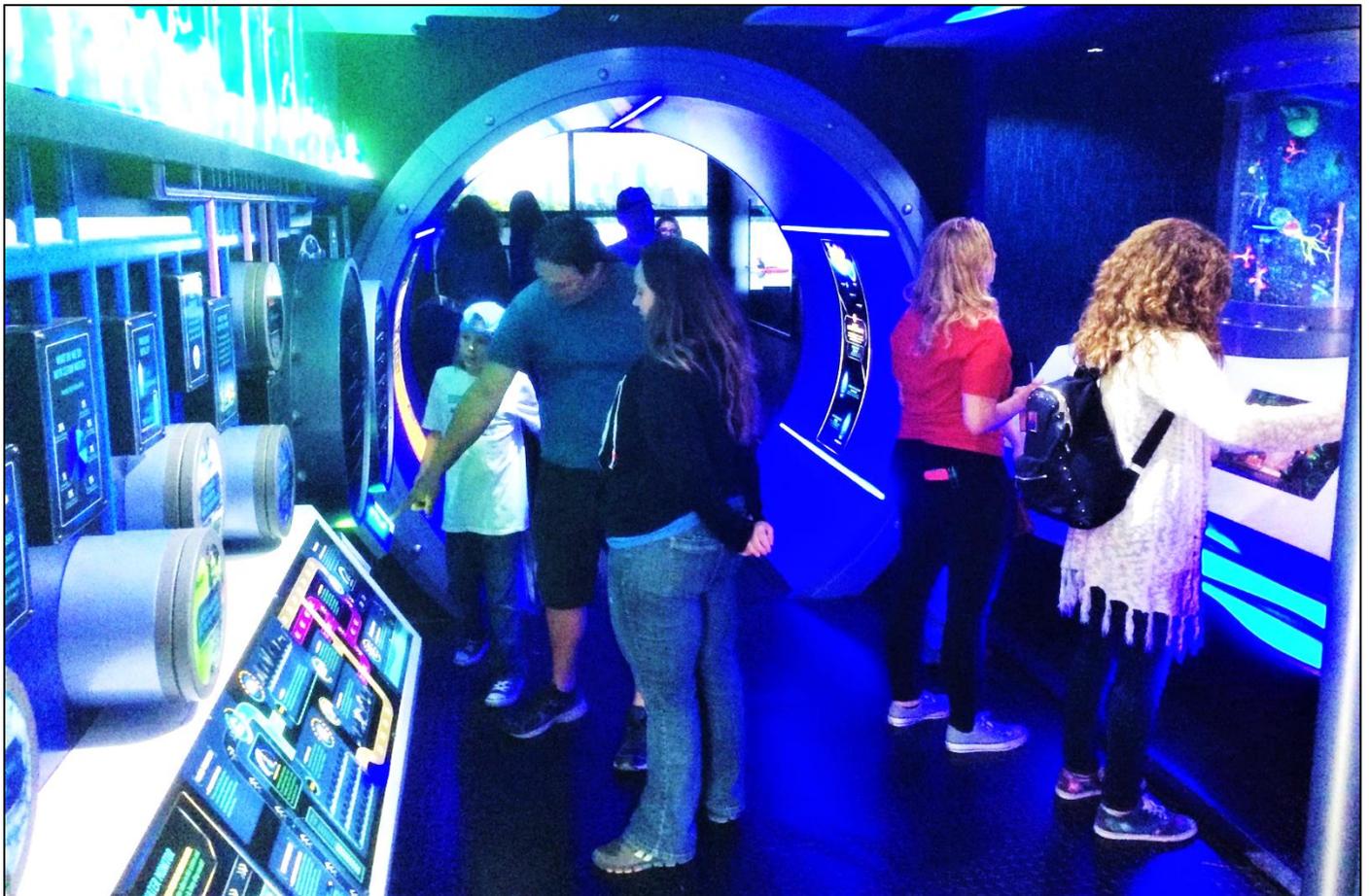




MOBILE RIVER PROGRAM ANNUAL REPORT

July 2016 - June 2017

Presented by the Colorado River Alliance



Mobile River Program Annual Report

Colorado River Alliance

July 2016 – June 2017

Introduction and Overview

The Colorado River Alliance, the Austin Independent School District, and Austin Water collaboratively launched the Mobile River Program in April 2015, and this report covers its second full year of operation, July 2016 – June 2017. The mobile unit itself and its corresponding classroom curricula are designed to meet specific program goals and objectives, as well as to support educators in meeting Texas state science standards (TEKS). The Texas Colorado River Rolling Exhibit, a.k.a. the Mobile River, is an interactive, water-science-center-on-wheels that visits middle school campuses and teaches students about the Colorado River, its watershed, and human interactions with local water sources. The program also includes four customized lesson plans with hands-on models that are administered by partnering teachers inside the classroom. This system allows educators to build core science knowledge and skills relative to watersheds and provide a sound educational experience to youth.

The 2016–2017 program year was one of many milestones and achievements for the Mobile River Program. For instance, in March 2017, The Mobile River won the prestigious Texas Environmental Excellence Award (TEEA). The TEEA program, which is awarded by the Texas Commission on Environmental Quality (TCEQ), honors and awards the state’s most outstanding programs in natural resources and environmental education. Not long after winning this award, the Mobile River welcomed its 20,000th visitor.



During the 2016–2017 school year, the Mobile River Program made important strides in basin-wide education by traveling to schools upstream and downstream of Austin. For two weeks in November 2016, the program traveled to the Gulf Coast and taught 591 seventh grade students in Bay City and Tidehaven Independent School Districts. While in Matagorda, the Mobile River also hosted a group of water leaders and elected officials who were participating in the Alliance’s Colorado River VIP Tour. In January 2017, the trailer made its way northwest to San Angelo, where it taught 899 seventh graders in three schools: Lee Middle School, Lincoln Junior High School, and Glenn Middle School.

During the program year, the Mobile River also made appearances at several community events, teaching people up and down the basin about the importance of the Texas Colorado River. The Mobile River’s community events included the following:

- Bastrop Patriotic Festival; July 2016; 775 visitors
- Bastrop Rodeo and Homecoming; August 2016; 187 visitors
- Colorado County Fair; September 2016; 515 visitors
- UT-Austin’s “Introduce a Girl to Engineering Day”; February 2017; 1,222 visitors

- Earth Day ATX; April 2017; 1,012 visitors
- Stonewall Peach Jamboree; June 2017; 365 visitors
- Pedernales Outdoor Family Weekend; June 2017; 120 visitors

This year, we also made improvements to our custom videogame inside the Mobile River, Texas 2040. Texas 2040 puts students and visitors in the role of city planner, making important decisions affecting Austin’s water future with the goal of sustaining our city’s growing population until the year 2040. We



made a timer in the game optional, which frees up time for teachers to have conversations with students as they move through the game’s turns, learning about options for water supply, water conservation, and so on. Removing the timer has given students the chance to ask questions on topics touched in the game like desalination, gray water, and water laws, while keeping kids engaged on how it all affects the Texas Colorado River and the state of Texas.

Another focus of the Colorado River Alliance through the 2016–

2017 year has been expanding our Spanish-language teaching capabilities. In our education programs, we have recruited Spanish-speaking interns and volunteer docents. Inside the Mobile River, we have translated the water calculator exhibit to be bilingual, and will soon be replacing two other exhibits to be bilingual. Providing bilingual programming ensures more people who step inside the Mobile River will be able to understand and carry on its message of river protection and stewardship.

As part of the Mobile River Program, we provide intensive internships that prepare each student partner to succeed in the next phase of their career. We are proud of their success: Fall 2016 intern Julia Doncaster was accepted into every public-health program she applied to, and she will be attending Ohio State University in 2018. Summer and Fall 2016 Intern Murat Deliomeroglu received his PhD in chemistry in Spring of 2017. Isabella Turcinovic, who joined the Alliance as an intern two years ago when she was a junior in high school, was recently accepted into Boston University.

Program Goals & Objectives

This program’s goal is to reach 9,000 people each year (5,500 7th graders and 3,500 community members). The Alliance is implementing this project by collaborating with both Austin Water and the Austin Independent School District (AISD), integrating both informal and formal education curriculum and building on preexisting middle school programs provided by all three entities.

Short-term target outcomes include:

- Student participants show statistically significant increases in water conservation and water quality knowledge, as well as in knowledge of related STEM concepts taught in classrooms.

- Students pledge to adopt personal water-conservation habits, resulting in 10 million gallons of water conserved annually through pledges.
- Students show statistically significant increases in interest in STEM professions.

Long-term intended impacts include:

- A workforce of professionals in STEM fields who are knowledgeable about water quality and water-conservation needs for a sustainable water supply
- A healthier Colorado River watershed
- Reduction in water use within the Colorado River watershed

Program Structure

The Mobile River program delivers a powerful educational experience for 7th grade students. Students spend one 45-minute class period interacting with exhibits, guided by staff and interns inside the trailer. In the classroom, they complete up to four lesson plans on water conservation, Texas ecoregions and weathering, watershed precipitation and runoff, and watershed pollution. Before the Mobile River deploys to a school campus, 7th grade science teachers receive up to four hours of training on classroom curriculum, and Alliance staff construct a customized curriculum delivery schedule to ensure all 7th grade science classes receive the same educational experience. Campus visits last one–two weeks, depending on the size and number of 7th grade science classes at each school. Student knowledge gains are assessed by administering identical pre-visit and post-visit knowledge questionnaires. Alliance staff also collect feedback from teachers after the program completes campus visits. The Alliance launched the Mobile River program on April 28th, 2015, and this report includes operations through the end of June 2017.



Program Participation Statistics

Table 1: Program Operating Statistics July 2016 – June 2017

Program Dimension	Metric	July 2016 - June 2017
School and Community Engagement	Total Mobile River Events	267
	Visits by Classes at Schools	244 (23 school visits)
	Private Group Events	11
	Public Events	12
	Total Individuals Served	10595
	General Public (<i>all ages</i>)	5017
	Public School 7 th Graders	5110
	Title I	3210
	Non-Title I	1900
	Private-event attendees	468
	Student Ethnicity	
	Caucasian	34%
	Hispanic	53%
African American	9%	
African	1%	
Middle Eastern	1%	
Asian	2%	
Other	0%	
Classroom Curriculum Impact	Total # Lessons Delivered*	11510
	Total # Educators Served	21
	Teacher Professional Development Hours	84
Volunteer Engagement	Total Volunteer and Intern Hours	1510

* Example: When a teacher uses a classroom model from our program to teach two of our curriculum lessons to his class of 25 students, this is counted as 50 lessons delivered. Not all teachers and classes complete all four lesson plans as part of a Campus Visit.

Student Knowledge Impacts

We compared the pre-visit and post-visit questionnaire scores from 2,440 7th grade students, many of which completed Mobile River trailer visits and all four of our program’s classroom lesson plans. To compute student knowledge scores, we scored the ten applicable questions on the pre-visit and post-visit knowledge questionnaires (see Appendix, Exhibit A), which cover curriculum delivered in the Mobile River trailer and through our program’s four classroom lesson plans. Our curriculum directly supports the 7th grade Curriculum Road Map (CRM) followed by AISD schools and the Texas Essential Knowledge and Skills (TEKS). Student performance within water-science and conservation topic areas is further explored in the Discussion section of this report.

Our student knowledge assessment for this Program Year was performed by using a repeated-measures Analysis of Variance (ANOVA). We also divided the data based on the Title I status of the students’ schools; 1,261 students were from Title I schools (those serving children from predominantly low-income households) and 1,185 students were from Non-Title I schools (serving children from more affluent households).

- *Our primary goal was achieved:* As a result of this program, student-knowledge increases in all areas were notable and statistically significant;
- Students from Title I and Non-Title I schools both scored significantly higher on post-visit knowledge questionnaires than pre-visit questionnaires (See Table 2 below, and Appendix, Exhibit B);
- Students from Non-Title I scored higher than students from Title I campuses on overall scores; and
- All mean score comparisons were statistically significant with p-values less than .05.

Table 2: 2016-2017 Mean student pre-visit and post-visit questionnaire scores for water science and conservation knowledge (% Correct/18 possible points)

	Pre-Visit Score	Post-Visit Score	Score Change*	# Students
All Students	52.44	67.20*	+ 14.75	2,446
Non-Title 1	61.09	78.42*	+ 17.33	1,185
Title 1	44.32	56.66*	+ 12.33	1,261

* All mean score comparisons were statistically significant with p-values less than .05.

Student Water Conservation Habits and STEM Interest Assessment

The remaining two items on the questionnaires assessed student interest in STEM (Science, Technology, Engineering, and Math) careers (Question #4) and willingness adopt various water conservation habits (Question #10). Student scores from both questions were assessed by using a repeated-measures Analysis of Variance (ANOVA) which included students’ school Title I Status as a factor.

Student Interest in STEM Careers:

- The mean student scores from both pre- and post-visit questionnaires indicate that students still had a slightly negative interest level in STEM careers.

Table 3: Mean student pre-visit and post-visit questionnaire scores for STEM career interest (On a scale of 100, 10 = “Not at all interested,” 50 = “Neutral,” and 100 = “Very Interested.”)

	Mean Pre-Visit Score	Mean Post-Visit Score	Change in Score*
Score	40.73%	41.72%	+ 2.43%

* Note that this change was not statistically significant.

Water Conservation Habit Adoption:

- *Our goal was achieved:* Students from both Title I and Non-Title I schools scored significantly higher on post-visit questionnaires than pre-visit questionnaires (See Table 4 below, and Question #10, Exhibit A) for water conservation pledges.
- All mean score comparisons were statistically significant with p-values less than .05:

Table 4: Mean student pre-visit and post-visit questionnaire scores for water conservation habit adoption (% of students pledging adoption of 4 habits)

	Mean Pre-Visit Score	Mean Post-Visit Score	Change in Score
Score	25.36%	29.98%	+ 4.62%

Table 5: Water conservation estimate for program year, assuming students adopt conservation habits they selected on Question 10 (see Appendix, Exhibit A)

Conservation Pledge Action	Students	Gallons Saved	Times per year	Annual Water Savings (in gallons)
Taking short showers (5 minutes)	1,777	3.5 per shower	365	2,270,117
Running full loads of laundry	1,091	25 per load	313	8,537,075
Turning off the faucet running while brushing teeth	1,954	2.5 per week	52	254,020
Running full loads in the dishwasher	1,031	20.5 per week	52	1,099,046
TOTAL				12,160,258

Additional Discussion

Student Learning Impacts

Students using the Mobile River’s curriculum averaged a 15% score increase in water science and conservation knowledge, regardless of whether students attended Title-I or Non-Title-I schools. Knowledge gains increased with the number of classroom lesson plans completed (see Appendix, Exhibit D) with a maximum of 19.74% score increase for 4 lessons.

Student Interest in STEM Careers

Student interest in STEM Careers is poor, and our programming is not making a significant difference in this (see Appendix, Exhibit C). Further work must be done to achieve more meaningful increases in STEM interest among students participating in our program.

Student Interest in Water Conservation

Students who pledged to adopt water conservation habits on post-visit questionnaires will save over 12 million gallons if they enact these habits over a one year period (see Table 5). Note that, for residents of the City of Austin as well as many other communities in our basin, municipal water comes from the Colorado River — conserving water means leaving water in the river.

Tactical Improvements for the Upcoming 2017–2018 Program Year

Based on our operating experience during the 2016–2017 program year, the Alliance will implement several tactical improvements to the Mobile River program’s logistics and resources:

- 1) Focus environmental education interns exclusively on mastering and delivering classroom lessons (as opposed to assisting inside the Mobile River itself). Goal: Achieve a 1 point increase per classroom lesson undertaken, by emphasizing one central question per lesson.
- 2) Upgrade lesson plans and physical models to accommodate AISD teacher feedback.
- 3) Update student knowledge questionnaires for improved clarity and to capture student language preference.

Strategic Initiatives for the Upcoming 2017–2018 Program Year

Roughly one out of every four of the 2.1 million people in the Texas Colorado River Basin speak Spanish. For 2017–2018, the Mobile River program will include only bilingual environmental education interns to assist in translating between Spanish and English while administering classroom lesson plans.

Supporters and Partners

The Mobile River Program would not be possible without the key partners and funders who helped develop this program and are supporting its ongoing operations. Primary recognition goes to the City of Austin’s water utility, Austin Water, and the Austin Independent School District, who continue to work with us to refine and deliver this program. Other key supporters include 3M, the Applied Materials Foundation, Atkins, the Austin Community Foundation (specifically, the Georgia B. Lucas Fund), BAE Systems, CH2M, Impact Austin, the Institute of Museum and Library Services, James and Sue Dwyer, the Lower Colorado River Authority, the Reese Foundation, Samsung, the Shield-Ayres Foundation, the Texas Pioneer Foundation, and the Trull Foundation.

APPENDIX

Exhibit A: Mobile River Pre-Visit/Post-Visit Student Questionnaire

Greetings Students! These questions take 10 minutes. They are not for a grade, and we will never know your name. Please circle the answer you think is correct. *If you don't know, circle "I don't know".*

1. Where do people in Austin get their drinking water from?
 - a. The Edwards Aquifer underground
 - b. The Texas Colorado River
 - c. The Colorado River in Arizona
 - d. The Gulf of Mexico
 - e. I don't know

2. Circle **ALL** of the home habits below that will save water:
 - a. Taking short showers (5 minutes)
 - b. Running full loads of laundry
 - c. Turning the faucet off while brushing your teeth
 - d. Running full loads in the dishwasher
 - e. I don't know

3. Circle **ALL** of the **sources** of pollution in our river:
 - a. Nutrients from fertilizer
 - b. Animal waste (poop)
 - c. Dirt and sediment washed in from construction sites
 - d. Algae
 - e. Trash such as empty plastic bottles
 - f. I don't know

4. Are you interested in using math, science, or engineering at your job when you grow up?
 - a. I'm very interested
 - b. I'm somewhat interested
 - c. I feel neutral about it
 - d. I'm not very interested
 - e. I'm not *at all* interested
 - f. I don't know

5) On average, who uses the most water each day?

- a. People from Kenya
- b. People from India
- c. People from Texas
- d. People from England
- e. I don't know

6) When it rains, which of the following landscapes would allow the most rain to infiltrate and become groundwater?

- a. A shopping center parking lot
- b. A field with trees, grass, and shrubs
- c. A neighborhood with houses, driveways, and yards
- d. A city street with buildings and parking garages
- e. I don't know

7) When it rains, which of the following landscapes would cause the most rain to run off the ground surface into streams and rivers?

- a. A grassy field with soaking wet soil from recent rain
- b. A grassy field with soft soil
- c. I don't know

8) Circle all of the following environmental processes that occur in the Texas Colorado River?

- a. Weathering
- b. Erosion
- c. Deposition
- d. Subduction
- e. Induction
- f. I don't know

9) Once pollution is introduced to the environment by humans, what is the biggest way it winds up in our rivers and lakes?

- a. It gets blown by the wind
- b. It gets dumped by people
- c. It is washed in by runoff from rain

- d. It gets left behind by animals
- e. I don't know

10) Circle each of the home water saving habits you pledge to adopt into your daily routine:

- a. Taking short showers (5 minutes)
- b. Running full loads of laundry
- c. Turning off the faucet running while brushing your teeth
- d. Running full loads in the dishwasher
- e. I don't know

11) On average, which Texas city among the four answer options below gets the most rainfall?



- a. Austin, TX
- b. El Paso, TX
- c. Dallas, TX
- d. Houston, TX
- e. I don't know

12) How much **liquid** freshwater exists on Earth?

- a. 100%
- b. 3%
- c. 1%
- d. .003% (so less than 1%)
- e. I don't know

Exhibit B: Overall Scores (% Correct) on Environmental Science and Water Conservation Concepts, 2016-2017

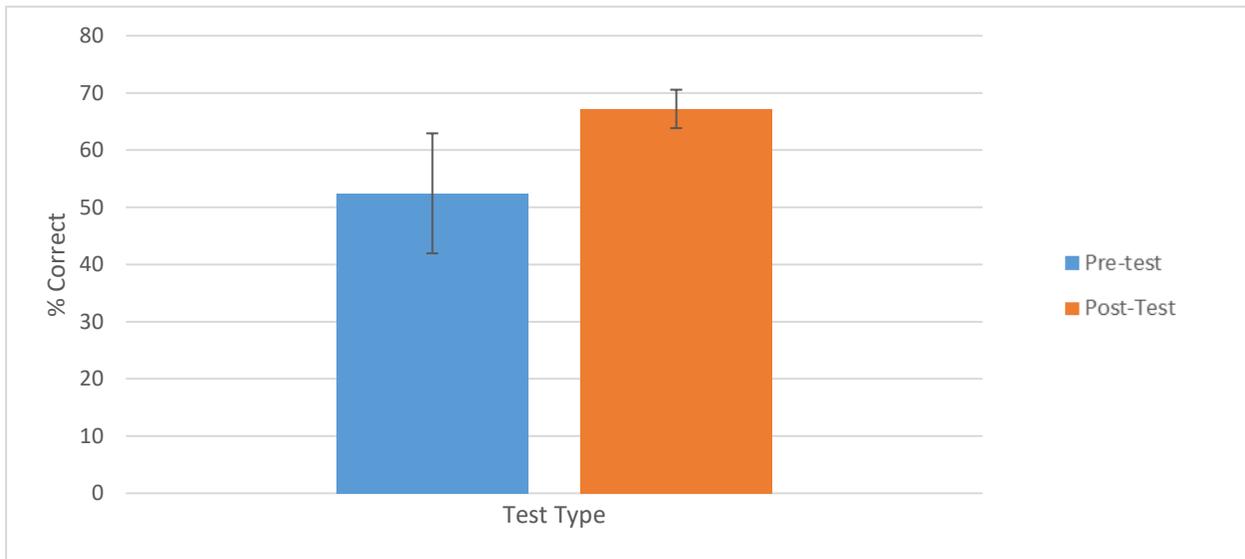


Exhibit C: Scores (% Correct) on environmental science and water conservation questions, 2016-2017 (See Exhibit A to reference each Test Question Number — note that questions 4 and 10 are not STEM content questions.)

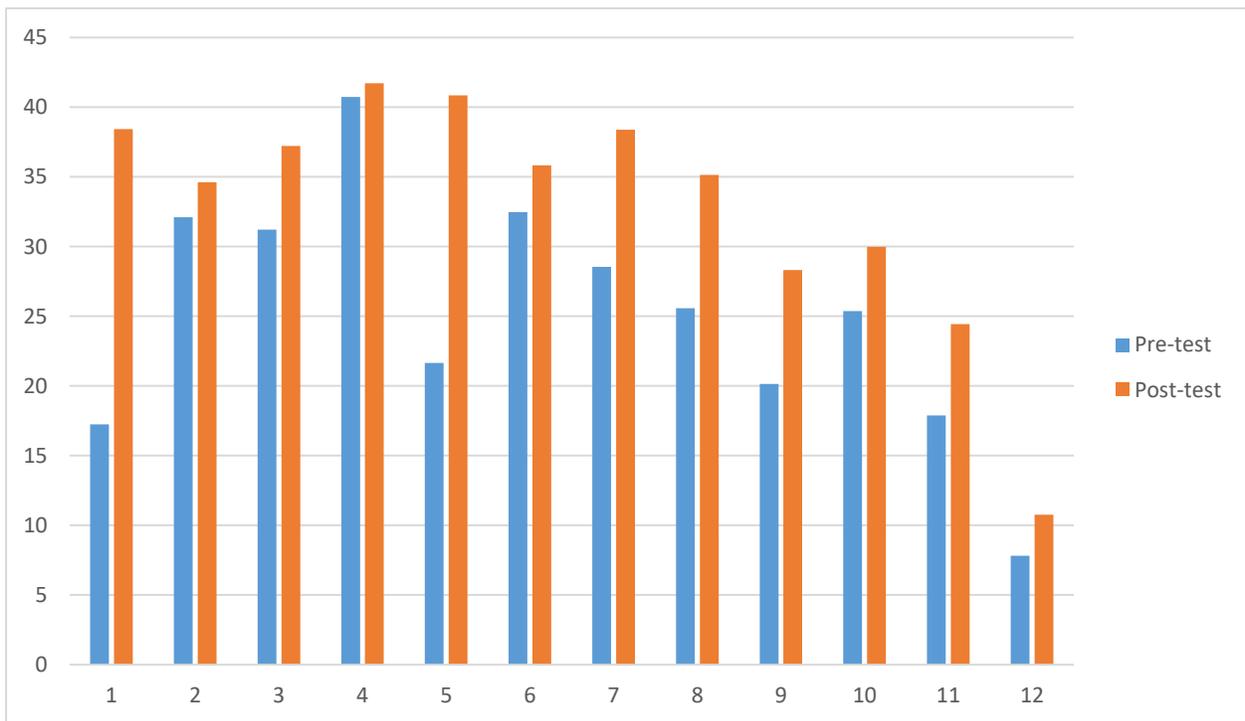


Exhibit D: Classroom Lesson Impacts: % Increase in Test Scores with # Lessons Completed, SY 2016-2017

